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**FBI Laboratory**2501 Investigation Parkway
Quantico, Virginia 22135**REPORT OF EXAMINATION**To: Boston
Kristin Koch

Date: April 21, 2014

Case ID No.: 415M-BS-2814367

Lab No.: 130416021 AAR AAV
130418012 AAR AAV
130420100 AAR AAV
130421100 AAR AAV
130423010 AAR AAV
130423012 AAR AAV
130424003 AAR AAV
130425018 AAR AAV
130427100 AAR AAV
130507008 AAR AAV
130726007 AAR AAV

Reference: Communications dated April 19, 2013; April 23, 2013; April 25, 2013; April 27, 2013; May 6, 2013 and July 11, 2013

Your No.:

Title: UNSUBS;
4/15/2013 Boston Marathon Bombing
IT

Date specimens received: April 16, 2013; April 18, 2013; April 20, 2013; April 21, 2013; April 23, 2013; April 24, 2013; April 25, 2013; April 27, 2013; May 7, 2013 and July 7, 2013

The following specimens were submitted under communication dated April 19, 2013 (FBI Laboratory Number 130416021) and received in the Trace Evidence Unit (Hairs and Fibers):

BOYLSTON STREET, SCENE 1 (SCENE A)

Q1 One (1) pair of pants (Your S1, E5180225)

Q1.1 Belt from Q1 (Your S1, E5180225)

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Q855.1 Insect trap from Q855 (1B2738, E5182411)

Q857 One (1) black sock (1B2733, E5182406)

Q857.1 One (1) black sock (1B2733, E5182406)

Q857.2 One (1) academic planner (1B2733, E5182406)

Q857.3 One (1) brochure (1B2733, E5182406)

The following specimen was submitted under communication dated May 6, 2013 (FBI Laboratory Number 130507008) and received in the Trace Evidence Unit (Hairs and Fibers):

THE FOLLOWING SPECIMENS WERE RECOVERED FROM 410 NORFOLK STREET, APT. 3, CAMBRIDGE, MA

Q930 Roll of pink paper (1B2993, E5756065)

The following specimen was submitted under communication dated July 11, 2013 (FBI Laboratory Number 130726007) and received in the Trace Evidence Unit (Hairs and Fibers):

Q1277 Four (4) trace samples from pants with belt, Dzhokhar Tsarnaev (Item 1B3208, E5029902)

Q1279 Three (3) trace samples from shirt, Dzhokhar Tsarnaev (Item 1B3210, E5029903)

Q1281 Four (4) trace samples from sweatshirt, Dzhokhar Tsarnaev (Item 1B3212, E5029906)

This report contains the results of the trace evidence (hairs, fibers and fabric) examinations.

Methods:

Microscopical examination of hairs is accomplished by using stereomicroscopy and comparison microscopy. The presence or absence, appearance, arrangement and distribution of the characteristics within the cuticle, cortex and medulla of the hairs are examined and may be compared during a hair examination.

Microscopical examination of fibers is accomplished by using one or more analytical techniques including stereomicroscopy, comparison microscopy, polarized light microscopy, fluorescence microscopy, and instrumentally using microspectrophotometry and Fourier

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transform-infrared spectroscopy. The microscopic characteristics and optical properties determined by these techniques are used for the examination and comparison of fibers.

Fabric examinations are accomplished through visual and microscopic examination of the fabric construction and the fibers comprising that fabric.

Results of Examinations:

Caucasian head hairs were found in or on specimens Q11, Q16.1, Q170, Q176, Q302, Q853 and Q854. Head hairs that exhibit Caucasian characteristics were found on specimens Q42.1 through Q42.6 and Q854. Caucasian head hair portions were found on specimens Q151.1, Q199.1 through Q199.25, Q302, and Q543.1. A Caucasian pubic hair was found in specimen Q183. These hairs have been preserved for future microscopical comparison purposes. A head hair sample should consist of approximately twenty-five full-length hairs selected from all areas of the scalp. A pubic hair sample should consist of approximately twenty-five full-length hairs selected from all areas of the pubic region.

Human hairs not suitable for meaningful microscopical comparison purposes were found on specimens Q11, Q11.2, Q16.1, Q40, Q42.1 through Q42.6, Q52.1 through Q52.5, Q74, Q125 through Q125.1, Q151.1, Q183.1, Q199.1 through Q199.25, Q301, Q302, Q433.1, Q458, Q480.1, Q575.1, Q583.1, Q853, and Q854. Human body hairs that exhibit characteristics of having been burned were found in specimens Q11, Q11.2 and Q16.1; the hairs from specimens Q11.2 and Q16.1 were labeled Q11.2.1 and Q16.1.1 for possible mitochondrial DNA analysis. Six hairs found on the unexposed areas of specimens Q42.1 through Q42.6 have been labeled Q42.6.1 through Q42.6.6 for possible mitochondrial DNA analysis. One hair fragment found on the unexposed areas of specimens Q52.1 through Q52.5 has been labeled Q52.5.1 for possible mitochondrial DNA analysis. One body hair found on the unexposed areas of specimens Q125 through Q125.1 has been labeled Q125.2 for possible mitochondrial DNA analysis. One hair fragment found on the unexposed areas of specimens Q183.1 has been labeled Q183.1.1 for possible mitochondrial DNA analysis. Two body hairs found on the unexposed areas of specimens Q199.1 through Q199.25 have been labeled Q199.25.1 and Q199.25.2 for possible mitochondrial DNA analysis.

A dog hair was found in specimen Q11.2. This hair has been preserved for future comparison purposes.

Textile fibers of various types and color were found in or on specimens Q11, Q39.1, Q42.1 through Q42.7, Q52.1 through Q52.5, Q53, Q53.1, Q74, Q86, Q108.1 through Q108.2, Q125 through Q125.1, Q151.1, Q158.1, Q167.6.1, Q183.1, Q185.1, Q191.1, Q192.1, Q195.1, Q227.1, Q255.1, Q268.1.1, Q293.1 through Q293.3, Q324.1, Q330.1, Q302, Q306.1, Q433.1, Q438.1, Q458, Q480.1, Q486.1, Q546.1, Q575.1, Q582.1, Q583.1, Q584.2, Q612.1, 641.1, , Q781.3, Q853 and Q854. These fibers have been preserved for future comparison purposes.

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Additional debris collected from the submitted specimens has been preserved. No other hair and fiber examinations have been conducted with this debris at this time.

No hairs were found in or on specimens Q42.7, Q44 through Q44.2, Q53, Q53.1, Q86, Q91.1 through Q91.3, Q109.1 through Q109.2, Q130.1, Q131.1, Q146 through Q146.1, Q152, Q157.1, Q167.6.1, Q171.1, Q185, Q185.1, Q190.1, Q192.1, Q202, Q209.1 through Q209.3, Q216, Q227.1, Q231.1, Q255.1, Q256, Q268.1.1, Q276.1, Q291.1, Q293.1 through Q293.3, Q306.1, Q330.1, Q391, Q392.1, Q394, Q394.1, Q438.1, Q438.2, Q460.1, Q486.1, Q510.1, Q546.1, Q603.1, Q604, Q643, Q647, Q656, Q667, Q668, Q671, Q779 and Q781.3.

No fibers or no fibers suitable for meaningful comparison purposes were found in or on specimens Q11.2, Q16.1, Q39.2, Q40, Q44 through Q44.2, Q91.1 through Q91.3, Q109.1, Q109.2, Q130.1, Q131.1, Q146 through Q146.1, Q152, Q157.1, Q170, Q171.1, Q176, Q183, Q185, Q190.1, Q202, Q209.1 through Q209.3, Q216, Q231.1, Q256, Q276.1, Q291.1, Q301, Q391, Q392.1, Q394, Q394.1, Q438.2, Q460.1, Q510.1, Q543.1, Q556.1, Q603.1, Q604, Q643, Q647, Q656, Q667, Q668, Q671 and Q779.

The fibers comprising the apparent burnt end of specimen Q584.1 exhibit characteristics of melting, vacuoles and fused fibers consistent with having been exposed to a heat source. No apparent burned areas of specimen Q585 were found.

The fabric portions of the Q151.1.1, Q183.1.2 and Q268.1.2 duct tape exhibit the same color, construction and composition as the fabric portion of the Q725.5 roll of tape. Accordingly, the fabric portions of the Q151.1.1, Q183.1.2 and Q268.1.2 duct tape are consistent with originating from the Q725.5 roll of tape or another source of duct tape whose fabric portion exhibits the same color, construction and composition. These results should be evaluated in conjunction with the results of the Chemistry Unit's analysis of the backing and adhesive portions of the tape.

The fabric portions of the Q151.2.1 and Q458.1 duct tape exhibit the same color, construction and composition as the fabric portion of the Q725.6 roll of tape. Accordingly, the fabric portions of the Q151.2.1 and Q458.1 duct tape are consistent with originating from the Q725.6 roll of tape or another source of duct tape whose fabric portion exhibits the same color, construction and composition. These results should be evaluated in conjunction with the results of the Chemistry Unit's analysis of the backing and adhesive portions of the tape.

Specimen Q930 is comprised of paper-type material and is not suitable for meaningful textile fiber comparisons.

The specimens were examined visually using stereomicroscopy and comparison microscopy.

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Interpretation:

The macroscopic and microscopic characteristics in hairs can be used to determine human or non-human origin, body area, racial characteristics, artificial treatment, damage, characteristics of decomposition and whether a hair has been forcibly removed or naturally shed. The characteristics exhibited in the hair(s) are used as the comparison criteria. When the presence or absence, appearance, arrangement, and distribution of macroscopic and microscopic characteristics exhibited in a recovered hair (s) are the same as in a potential source, the possibility that the compared hair(s) originated from the same source cannot be excluded. Consequently, the source of the known sample can be included as a possible source of the recovered hair(s), although the association of hairs using macroscopic and microscopic characteristics does not constitute a basis for personal identification.

Fibers can differ as to type (e.g. rayon, cotton), color, shape, size, microscopic features (e.g. presence of delustering agents, voids) and optical properties (e.g. refractive index, sign of elongation). These are characteristics that may associate fibers with a group of items, but never to a single item to the exclusion of all others. However, even fibers with many similar properties may be excluded as originating from the same source by using the identified analytical methods.

The characteristics present in fibers are used as comparison criteria. When all of the characteristics present in a recovered fiber are the same as in a potential source, the possibility that the compared fibers originated from the same source cannot be excluded. Consequently, the recovered fibers are consistent with originating from the known source, or from another source comprised of fibers that exhibit the same microscopic characteristics and optical properties.

An examination of the fabric portion of tape begins with the characterization of the fabric construction (e.g., woven, knit or non-woven) and an analysis of the fibers comprising the fabric. When all of the characteristics present in a fabric sample are the same as in a potential source, the possibility that the compared fabric originated from the same source cannot be excluded.

The inability to associate specimens through a microscopic hair/fiber examination does not preclude that the persons/items of interest had contact with each other. A number of factors can produce this result, including: 1) Hair/fiber evidence may not have transferred. 2) Hairs/fibers that did transfer may have been lost prior to submission to the laboratory. 3) The hairs/fibers transferred or the known comparison specimen submitted may not be representative of the source. 4) The hairs/fibers may be from a different source.

Remarks:

The supporting records for the opinions and interpretations expressed in this report are retained in the FBI files.

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For questions about the content of this report, please contact Physical Scientist/Forensic Examiner Joshua D. Friedman at 703-632-7691.

For questions about the status of your submission, including any remaining forensic examinations, please contact Forensic Examiner Edward Knapp at 703-632-7644.

The submitted items will be returned at the completion of the requested examinations.

Joshua Friedman
Trace Evidence Unit

This report contains the opinions/interpretations of the examiner(s) who issued the report.